

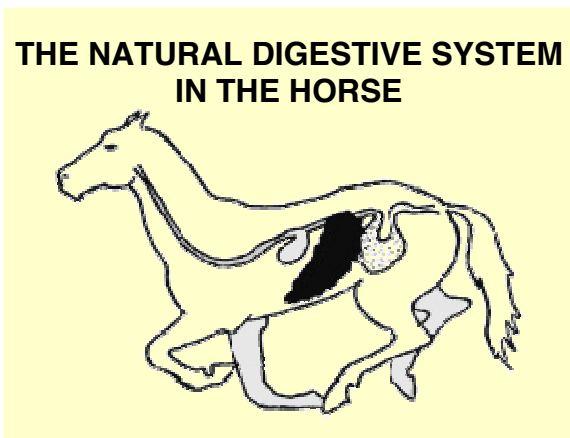
LATEST UPDATE

SALMONELLA IN HORSES

Dr Jennifer H Stewart BVSc BSc PhD MRCVS Dip BEP AAIM
Equine Veterinarian and Consultant Nutritionist to Mitavite

Ongoing research into equine nutrition and health has revealed that many current feeding practices actually increase the risk of horses developing Salmonella. Salmonella is a major cause of diarrhoea and can lead to laminitis; kidney, liver and heart damage; chronic weight loss, ill thrift and death.

More recent research has demonstrated that the increased risk of Salmonella is linked to whether feed is *digested or fermented*. *Digestion* takes place in the small intestine. *Fermentation* occurs in the hindgut, otherwise known as the caecum. As shown below, the small intestine is very short and feed passes through quickly.



STOMACH reservoir for

SMALL INTESTINE

Digestion should take place here. Food takes 1-2 hours to pass through. Any feed not digested, ferments when it enters the caecum.

CAECUM (HINDGUT)

Holds up to 100Kg. Food ferments in here for up to 30 hours.

LARGE INTESTINE

Diarrhoea occurs when acid, ammonia and bacteria damage the large intestine. When this happens, up to 40 litres of water and salts are lost per day and bacteria can invade the body.

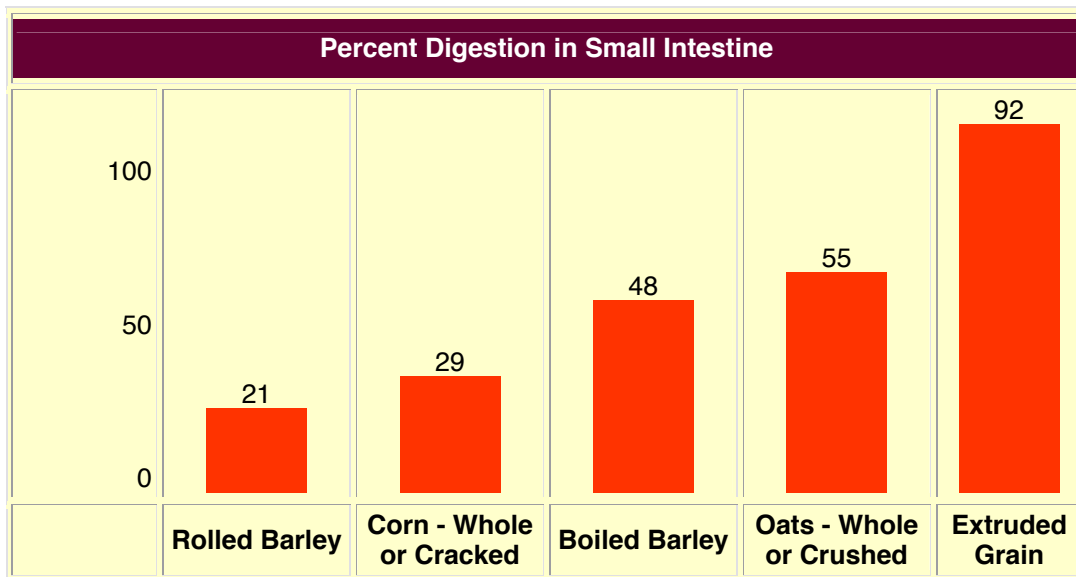
The small intestine is easily overloaded. When this happens undigested starch and protein pass to the caecum (hindgut). There are no digestive enzymes in the caecum. The caecum has evolved to ferment fibre (rather like a compost heap). When starch and protein ferment they are converted to acid, heat, gas and ammonia. A build up of acid in the caecum is called 'caecal acidosis'. Caecal acidosis leads to the following disturbances:

- 'good' bacteria that are beneficial for health do not tolerate acid conditions so they die
- harmful bacteria like Salmonella and E. coli like acid conditions
- high ammonia from fermenting protein provides 'food' for harmful bacteria
- the combination of acid, ammonia and bacteria damages the lining of the large intestine allowing bacteria to invade the body; water and salts pour into the large intestine through the damaged lining - horses can lose up to 60 litres of fluid per day

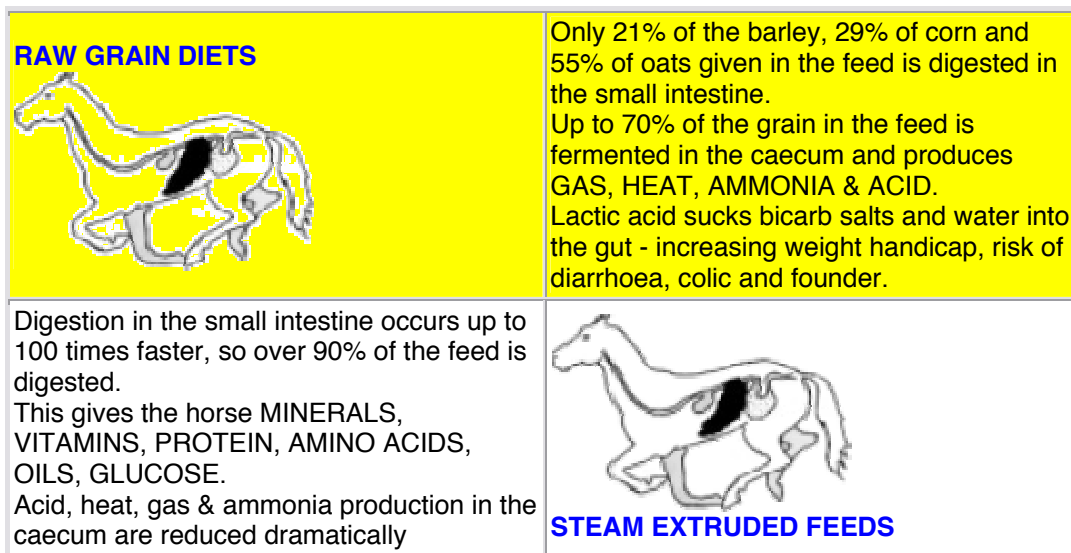
PREVENTION:

1. **feed small meals** 3 to 5 times a day rather than 2 large meals. The small intestine has a limit of around 2 kg of concentrate per feed. When more than 2kg is given per feed, the small intestine is overwhelmed and undigested feed passes directly to the caecum.

2. **use processed grains**. The graph below shows that even when fed in small amounts, most raw grains are not well digested in the small intestine. Steam extrusion increases digestion in the small intestine to over 90%.



The following diagram shows how feeding can increase or decrease the risk of Salmonella.



When feed is digested in the small intestine, all the nutrients are released and absorbed. When feed is fermented in the caecum, over 50% of the feed is converted to acid and ammonia. Acid and ammonia damage the wall of the caecum and large intestine and upset the natural balance of the digestive system. This increases the risk of diarrhoea, colic and laminitis. Steam extrusion shifts the site of digestion back to the small intestine where nature intended it to be.